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ABSTRACT

Summarized is research performed by the Project staff from 1969 to 1973 with 125 to 300 educable mentally handicapped (EMH) or emotionally disturbed elementary and secondary school students in Syracuse, New York. Project purposes are described in terms of a system of evaluating and field testing educational materials (such as captioned films) and effective teaching techniques with handicapped children. The 14-step evaluation model is explained to begin with the assessment of curriculum and learner needs and end with final decisions regarding material acquisition and utilization. Investigations concerning the evaluation design and technique (pretest-treatment-posttest) are discussed as are questions of sample size, item number, and differences among population subgroups. Investigations of testing effects with EMH children are said to have centered on the effects of pretesting and the effects of response modalities (whether at the computer terminal or by paper and pencil). Vocabulary level is seen to have been investigated through the validation of an available vocabulary list and the development of computerized techniques to process narrative texts by word frequency and level of difficulty. It is reported that investigations concerning children's responses revealed that responses tended to be short and failed to exhibit understanding of important concepts. Also noted are teacher reactions and attitudes to the films. (DB)

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SUMMARY OF RESEARCH

COMPUTER BASED PROJECT

1969 - 1972

The studies summarized here were supported in part by a contract with Media Services and Captioned Films for the Deaf, Bureau of Education for the Handicapped, United States Office of Education. This support in no way constitures an endorsement of the conclusions, summaries, techniques, materials, or equipment used. Further, no endorsement is made by the Syracuse, New York, City School District.

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F O R E W O R D

This document is a summary of a number of small inhouse investigations performed by the Computer Based Project for the Evaluation of Media for the Handicapped during the period September 1969 through July 1973. Numerous persons were involved in the collection of data, discussion of findings and implementation of decisions based on the studies, and these are noted in the references.

The research and evaluation effort of the Project during the four years covered by the report has developed from the following assumptions:

a) A number of questions are generated as one proceeds to work with data from educational activities.

b) Questions relating to specific project decisions must be investigated to give the decision a basis for validity.

c) The investigation of all questions suggested or generated is impossible.

d) Staff members have specific interests that can be met.

e) A framework of general investigative parameters should be specified.

Research was needed as Project efforts began. General questions arose concerning identification of the educable handicapped child, his capabilities and limitations, and his responses to mediated instruction. To keep the research effort from fragmenting in different directions, five major topics were identified to guide investigators. the effects of pretesting, best response modes, the effects of captioned films, student characteristics related to media use, and the miscellany of data needed to support operative decisions.

Apparent differences in the reporting of findings in the section summaries and those appearing in the original report are recognized as being the result of this author's having access to all material at one time and the inevitable differences in conceptualization of two or more individuals.

This summary is presented in an effort to disseminate the findings of the Project and to expand the knowledge about effects of mediation on handicapped children and measurement problems associated with determining a material's effectiveness. Publication here does not preclude the later inclusion of part or all of the document in educational journals or other professional publications.

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Chapter I

Introduction

Since initiation in 1969, numerous activities undertaken at Computer Based Project in accordance with contract obligations with Media Services and Captioned Films have been in the nature of quasi-experimental research and/or investigative studies. This Report is a composite of such investigations published to share with others interested in evaluation, particularly media evaluation, and special education the insights gained and the implications of work done at CBP. Though more questions were uncovered through the investigative efforts than answered, the summaries contained herein will aid other investigators in avoiding many of the problems encountered, formulating more appropriate questions, and extending the efforts begun.

The Computer Based Project for the Evaluation of Media for the Handicapped (CBP) was funded by Media Services and Captioned Films (MS/CF), Bureau of Education for the Handicapped (BEH), in the summer of 1969:

(a) To demonstrate an effective and efficient system of evaluating and field testing educational materials with a variety of handicapped children.

(b) To demonstrate an effective technique for educating handicapped children with a major emphasis upon maximum support of the learning process through media, tutoring, team teaching, and a systems approach to education. (CBP Proposal, 1969).

CBP has applied the systems approach to the testing and evaluating of instructional materials for handicapped childrn and is providing information and services for the improvement of learning of handicapped

children through the appropriate use of instructional technology. The CBP staff has developed an evaluation model based on student responses to instructional materials and studied the related issues of the interaction between student characteristics and media characteristics. In addition, the CBP staff has been involved in teacher-training and curriculum implications of increased media use and dissemination of evaluation results.

During its last year, CBP will complete the evaluation of the films in the NS/CF depositories. This evaluation involves using captioned films, designed and provided for the deaf, with other educationally handicapped populations. CBP will also use the evaluation model to determine the effectiveness of media other than captioned films and to expand the evaluation of the NS/CF depository holdings with deaf populations.

The Evaluation Model

The CBP evaluation model is the process through which CBP evaluates media, particularly captioned media. The model encompasses several assumptions.

(a) Children can provide vital information for making decisions about the effectiveness of media.

(b) Objectives of materials should be specified.

(c) Criterion items can be developed and provided for practitioners to measure the expected outcomes.

(d) Characteristics and outcome parameters may be assigned so that comparisons between media can be made.

Bond (1972) has described the evaluation process in considerable detail. It is summarized in the flow chart and discussion below (adapted from Miller, 1973).

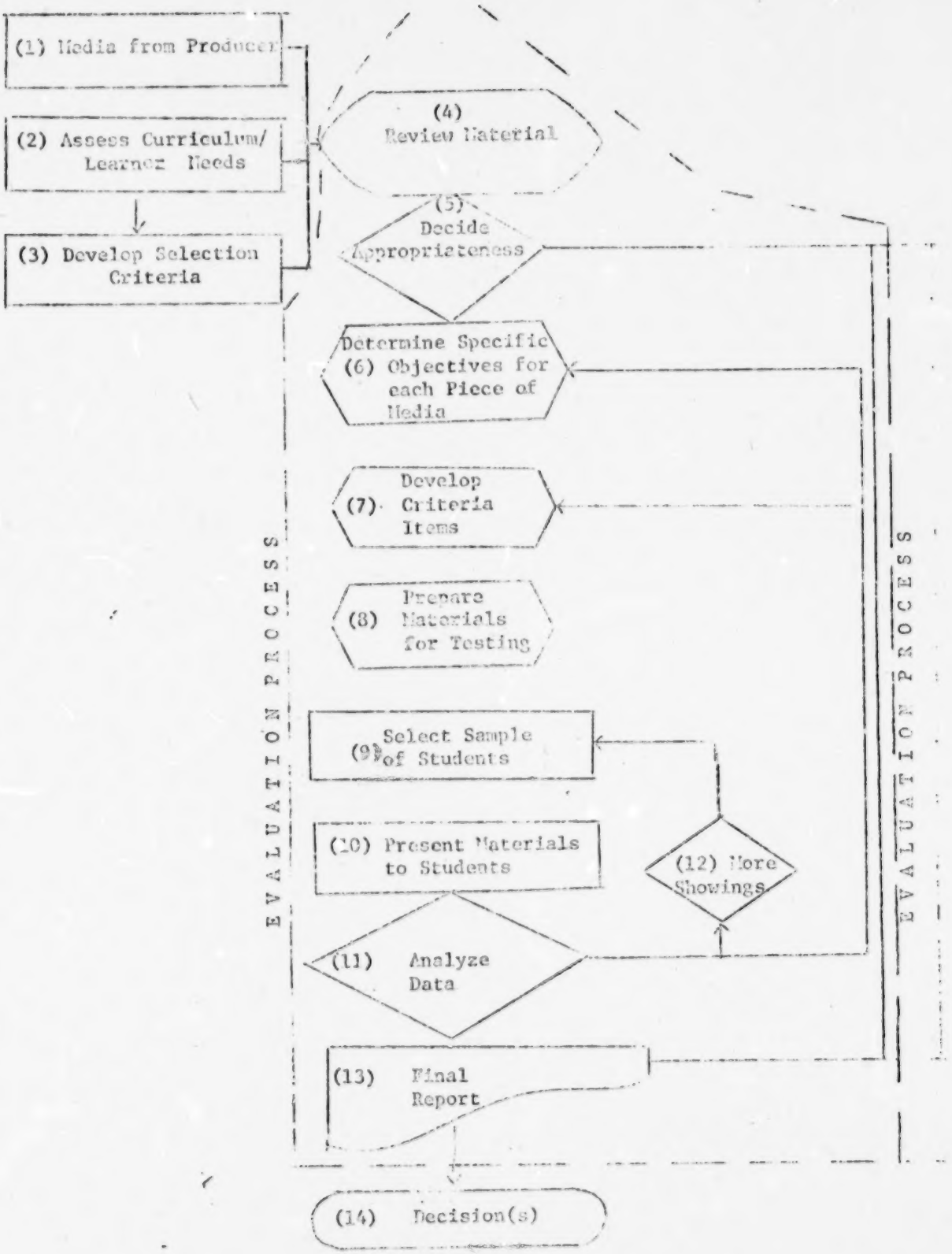

FIGURE 1-1 Evaluation Model Flow Chart

	STEPS		DISCUSSION
1.	Assess Curriculum/ Learner Needs		The premise is that media should fit the needs of the learner. Ideally, media should be prepared to meet the particular needs of each learner or group of learners.
2.	Develop Selection Criteria		The selection criteria are stipulated by the needs assessed in 1. These criteria allow the evaluator to narrow the search to relevant material.
3.	Media from Producer		W/or w/o objectives and test items.
	Evaluation Process		
4.	Review Material		This is the initial screening step. Criteria developed at Step 2 are applied here.
5.	Decision	Reject	Media that does not pass the initial review are rejected, and a report specifying the deficiencies is written.
		Accept Final Report	If material passes the initial review, it is then scheduled for the rest of the evaluation procedure.
6.	Determine Specific Objectives for each piece of Media		General objectives are determined by curriculum/learner needs. Step 1. Specific objectives are extracted from each piece of media depending on its content, format, etc.
7.	Develop Criteria Items		A set of criteria-referenced test items is developed for each piece of media, based on the objectives extracted in Step 6. Care should be taken on the formulation of test instruments.
8.	Prepare Materials for Testing		The test items are photographed as slides for presentation to the students.
9.	Select Sample of Students		This step may be done at any time after the appropriate upper level of the film is established.
10.	Present Materials to Students		Requires normal effort in scheduling, etc. NB. Shown to highest appropriate group.

11.	Collect and Analyze Data	Administer Criteria-Referenced Test. Gather interview data, teacher data, etc. Clear statements of the factors to be analyzed must be made. Recommendations for objectives, items, other groups and the final report are used as inputs into Step 6, 7, 9, and 13 respectively.
12.	Showings to Other Groups	If incomplete decisions remain, the process recycled into Step 9 for more or different groups.
13.	Final Report	This report may be descriptive/formative or judgmental/summative

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14.	Decision(s)	Prior to making "decisions", decisions on decisions must be made. Below are three possible decisions.
	Reject	1. What decisions are going to be made?
	Purchase or Rent	2. Who is going to make the decision?
	Show to Whom	3. What criteria are going to be used for the decision?

Project Research and Dissemination

Initially, investigative activities conducted for the purpose of meeting contract obligations were recorded in-house, fulfilling the need to substantiate procedure decisions with data. In 1970, the site visit team suggested that these investigations be expanded and reported to limited audiences such as Project consultants and HS/CF (Site Visit Report, 1970). As the evaluation procedure got underway, a number of related interests were generated; and recommendations were made to make Project results available to the larger field-defined audience (Site Visit Report, 1972). A dissemination objective was developed during the fourth year of Project operation and agreement made to produce a summary of Project investigations.

The records substantiating the Project's research-type activities have similarly developed from informal investigative reports to formal procedures for problem specification, data form and reporting. Early studies consisted merely of a file folder with raw data and notes, together with a concluding statement of findings presented to the staff. During the second and third year of Project operations, investigative reports included data compilation. In 1973 research-type activities were formalized with specific assigning of staff, sample, and instruments, as were the research report format and procedures.

The summary of reports draws from both the informal investigations and formal research, the purpose being to make available to those interested the results of Project activities.

Terms and Abbreviations

Because of the frequency of a number of titles and the special meaning that these and other terms have specific to the Project, titles are specified and terms defined as follows:

Chronological Age (CA): Age of a student determined by subtracting his date of birth from December 1 of the current school year.

Educable Mentally Handicapped (EMH): Children who have scored between 50 and 75 on a standard individual I.Q. test and have been judged to benefit from a special class placement. The Project works with 200 - 300 of about 900 available subjects.

Experimentor (E): Staff member manipulating or observing the situation, material, or child in a way that has been defined and outlined to obtain specific information particularly for a study or investigation.

Intelligence Quotient (IQ): A ratio determined from the mental age and chronological age of a subject after having been administered a standard IQ test. The two individual tests used with project subjects are the Stanford Binet and the Wexler Intelligence Scale for Children (WISC). Both tests give a full scale (FS) ratio and the WISC also computes a performance (PIQ) and a verbal (VIQ) sub ratio. All three values are used if available.

Mental Age (MA): Determined from a tabled value obtained by a two-variable matrix consisting of CA and the score received on the standard IQ tests of Stanford-Binet or Wexler Intelligence Scale for Children (WISC).

Operators or System Operators: Referring to the staff person who controls the recording of responses using the SRS system.

Participant Observation (PO): A research approach in which the major activity is characterized by a prolonged period of contact with subjects in the place in which they normally spend their time. During the encounters, data, in the form of field notes, are unobtrusively and systematically collected.

Student or Child (S): Child responding to a prescribed treatment or participating in a study.

Student Response System (SRS): An automated system consisting of devices to collect student responses from pushing a button. In this document, SRS refers specifically to the General Electric SRS-1000 installed in the Project facility.

Syracuse Scholastic Rehabilitation (SSR). Children who have emotional problems of such magnitude that they cannot be placed in the regular classroom. They are placed in small groups (maximum of 10) and assigned to individual therapy sessions with a psychiatric social worker and a special teacher. An SSR child is reassigned to the regular classroom when he can control his behavior and emotions.

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Chapter II

Investigations Concerning Evaluation Procedures: Design and Technique

The Project had available a population of special education children and their teachers and a library of captioned materials to develop the evaluation process. Although the conducting of research studies was not the primary purpose of the Project, the necessity of such efforts in developing and validating evaluation procedure was apparent to the staff. Of special concern were the designs used for evaluation and issues of control and the techniques of data collection.

Design

Early data collection efforts were conceptualized as being of Solomon Four-Group Design to verify the base line responses of students to a filmstrip or film. The lack of reference points for base line responses suggested the pretest-treatment-posttest model to obtain both the base line before-treatment response for EMH children and the changes following treatment.

Pretest Only		
Pretest	No Treatment	Posttest
Pretest	Treatment	Posttest
	Treatment	Posttest
		Posttest

Figure 2-1: Solomon Four-Group Design

The Solomon Four provided for verification of these responses and the level of the responses in the non-treatment setting. It was recognized, however, that the expenditure of staff and subject time for meeting the requirements of such a design would require resources greater than those available. Furthermore, because of the short time lapse of treatment (showing an eight to 20 minutes film) and the fact that some groups would be responding to items without treatment, it was rationalized that the information obtained from the pretest only and posttest only cell would be provided essentially by the pretest-no treatment-posttest group (Fruzek, 1970) and that this information could be obtained by mixing items. Thus the design evolved as a simple treatment control where two groups are shown different films. The gain comparison for Film A is made between Items A (Group II) and Posttest A (Group I) and likewise for Film B.

Group I	Treatment Film A	Posttest A	Item B
Group II	Treatment Film B	Posttest B	Item A

Figure 2-2: Evolved Design

Early comparisons of the test scores indicated that no differences were measured in the pretest-no treatment-posttest groups; therefore, this section of the design was dropped. Comparisons of the posttest scores of the pretest-posttest groups revealed a depressing effect of the pretest of about 10% (Bond, 1970) which would result in a more conservative estimate of the learning. This was thought to be desirable and the treatment-posttest situation was dropped. The simple pretest-treatment-posttest model was adapted for data collection.

Pruzek (1971) suggested that the contamination effects of pretest on the same group as the posttest could be overcome by using independent though equal groups for the pretest by mixing items from a film not seen into the instrument used as the posttest for a film seen. This would provide for only one testing situation with a class and the showing of a film to every class. Studies have indicated no change in the level of response obtained from a pretest or from the items mixed into another test (Bond, 1973).

Control Issues

Two schools of thought concerning control groups were prevalent within the consultant services available to the Project for comparisons in experimental studies: that the control group is explicitly defined, identified, and participates by providing data as described in the original plan; or that control is maintained statistically and the control group identified as it meets the criteria or participates by administrative error or change. For example, one could study the effects of sample size by specifically designing data collection for a small group, larger group, and still larger group and collecting such data; or one could obtain a data base where a number of responses are available and randomly draw larger and larger samples, recomputing the values of the sample statistics. The latter concept has been applied in most Project studies.

To verify assumptions about sample size and to check differences among population subgroups, specific studies were initiated. Under Bond's assumption that data from one child is better than none, the Project proceeded to develop the evaluation process using very small

independent samples of 3 to 10 children. Bond (1972) investigated the item responses of 70 children to the filmstrip 'Our Hands' by drawing samples of 5, 25, and 50 from the total population (90) and concluded that estimates based on samples of 5 were unchanged by estimates based on larger samples.

Another issue of concern was the number of items used to measure a medium's effectiveness. Observation indicated that the quality of items produced by writers diminished after about 15 items had been created for a given film/filmstrip. Thus from a production viewpoint, a 10 to 15 item instrument seemed desirable. Kiesau and Bond (1970) investigated the quantitative issue of question-set size, the number of items presented in a single sitting, with junior high level EMH children. They administered a set of 25 items and observed that students began exhibiting deviant behavior after responding to 15 questions, with the number of deviations and number of students involved increasing with the number of items: only 2 of 12 children responded to the 25th item. Informal observations made by operators and teachers in the SRS system established 10 items as a maximum for any one presentation with primary EMH and SSR children. Hoy and Barcikowski (1973) recommend 6 item tests with several subtests made from the item set as preferable for estimates of means and standard deviations. In line with the findings, the Project produces an item set of 10 or more items and administers, after film presentation, a combined set comprising about 5 items from the film seen and 5 from a film not seen. Thus one group provides baseline data on the film not seen and achievement data on the film seen.

Perceived differences among population subgroups, EMH and SSR, provided a third control issue and were examined. No significant difference on test responses was found between educable mentally handicapped (EMH) and emotionally disturbed (SSR) populations. One group of children designated EMH but exhibiting considerable emotional instability, however, was found significantly different in its responses from both EMH and SSR populations (Lewis, 1971).

The question of the effects on transporting children to the evaluation facility was investigated during the second and third years of operation, when the Project expanded its student population from 125 to 300. SRS observers questioned the reliability of responses of transported children as compared with non-transported children: those transported to the facility appeared to be more active. Bond and Winchell (1973) found that although transported children required more time to answer a given set of questions, there were essentially no differences in the scores obtained.

Data Collection Techniques

Student Response System

The GE SRS-1000C Student Response System (SRS) provided a method of monitoring student performance in either the group or the individual mode. The system is composed of five major assemblies: fifteen student stations, instructor's control panel, class display, interface unit, and output junction box. Each assembly is discussed in detail in a Project report (CBP, 1970). It is appropriate here to summarize by

saying that the SRS is one of several methods of data collection used by the Project. For film evaluation, the SRS group mode has been used extensively, providing input for 75% of the cognitive response base over a three year period.

The individual mode has been used for filmstrip evaluation. Four carrels were modified and equipped with a rear projection screen, student station, head set, and individual confirmation unit. During presentation of a filmstrip or slide sequence, visual frames are synchronized with the audio tape using the GE AVR Digital Tape Recorder for audio and slide change pulses and controlled by the student performing in the carrel. The student's responses are monitored by the SRS and recorded on a punched paper tape that is fed directly to the computer for analysis. Problems relating to the operation of the carrels have been reported by Plotnick (1973).

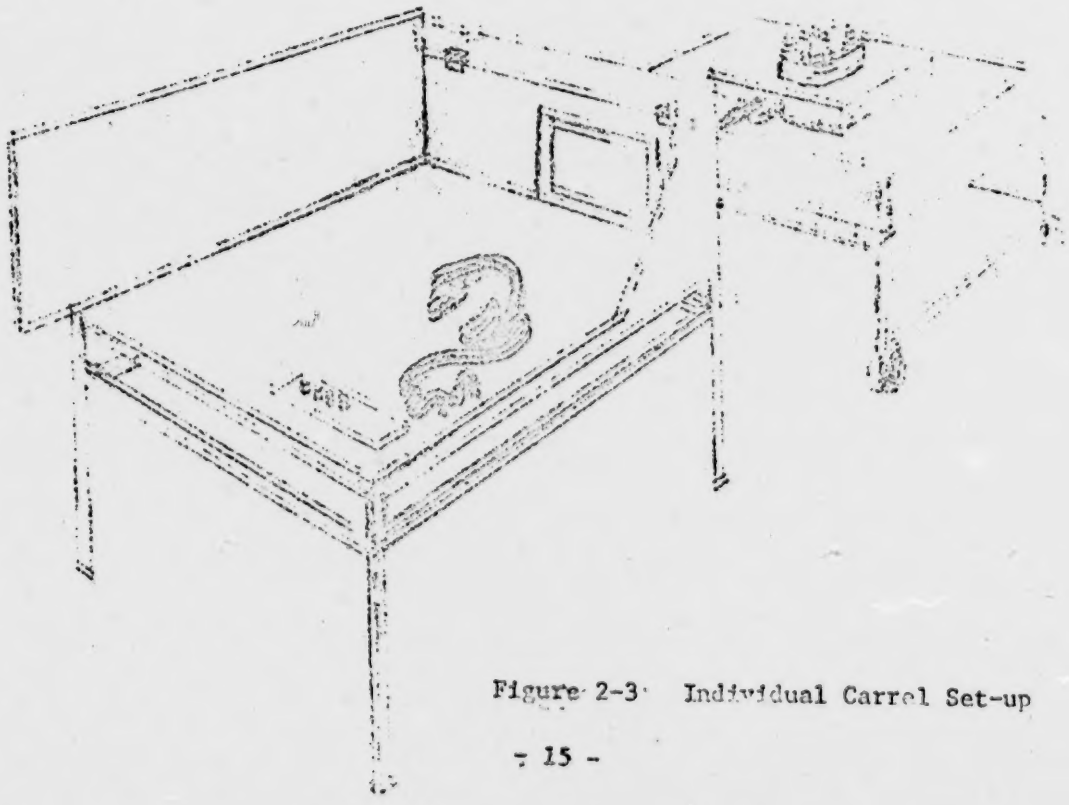

Figure 2-3 Individual Carrel Set-up

Item Length

Attempts to obtain information from children revealed a number of problems. Traditional testing procedures subsuming well developed verbal skills on the part of respondents were found inadequate for EMH children. Thus efforts were made to refine types of verbal items used in SRS procedures and to develop attention profile and interview procedures.

Guidelines for items used in the pretests and posttests of media evaluation were established as a result of both consultant recommendations and investigations with the Project. Such guidelines apply to question-stem length, number of answer choices, answer-choice length, and level of vocabulary. Hecker (1971) suggested that EMH children could remember a maximum of four choices, if such choices are one word in length and drawn from familiar concepts. She further suggested that items be positively stated. Gronoski (1971), investigating the relationship between correct responses to questions and the length of answer choices, found a greater number of random choices and wrong answers to long items as compared with short items.

Interviews

Use of observation and verbal interview to substantiate cognitive responses has led to development of individual and group interview checklists and experimentation with scalar designations of response (Lewis, Morris & Bond, 1971) as collected through SRS procedures. A group interview consisting of four items designed to determine whether or not a student liked the film is administered following the film presentation and posttest. It was found that EMH children did not demonstrate the ability to deal with

scalar semantic responses and that experimenters were unable to communicate the response procedure or criteria to the children. Scalar response requirements were simplified to three categories of *liking*. Students are asked whether they liked the film "not at all", "a little", or "a lot". In another question, students are asked whether they would like to see the film again. Bond (1972) found high correlation (.95) between a student's response as "liking a presentation" and "wanting to see it again".

Attending Behavior

After a number of experimental trials, a technique of obtaining attention measures evolved by taking observations of the "eyes on the screen" behavior of a group of children viewing a film presentation. The observation consists of recording the number of a selected sample of children watching a visual presentation at specified intervals so that comparisons can be made later based on the resulting frequency curve for the visual experience presented. Two dimensions are considered and collected simultaneously: the number of subjects watching and interval of time. After some experimentation with length of time intervals and subject sample sizes observed, a five-second time interval and a sample of five randomly selected students were determined for one data-gathering event. In investigating the question of inter-observer reliability, Bond (1971) found agreement between observers to be .95 and greater, leading to the decision that only one observer was necessary to record an attention profile for a given film showing.

To compile attention profiles for a given film, composites are made of observed sample behavior. During a presentation, an observer positions himself in such a way as to observe clearly the 5 subjects' eyes as they view the film, recording attending behavior on the attention profile form. After several presentations, the samples of 5 subjects who saw the same film are compiled into a time series line graph indicating the frequency of subjects watching (vertical value) at each five-second interval (horizontal value) (See Figure 2-4). This composite frequency graph becomes a visual representation of the attentive behavior exhibited during the length of the media presentation. Time Series analysis, particularly the non-stationary moving average model (Box & Jenkins, 1970) is particularly well suited for reducing attention observations to summary information and statistics for comparisons between parts of a profile.

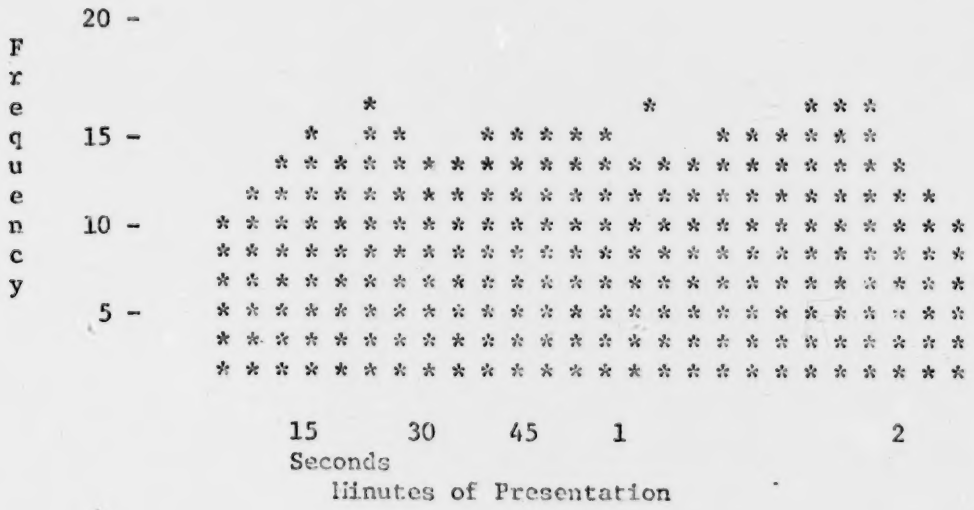

Figure 2-4: Graphic Solid of Attention Profile for 24 Children

The second profile presentation is a time graph (Figure 2-5) showing plots of up to three separate classifications (primary, intermediate, and secondary or 3 different observers) of the observed population simultaneously from the same raw data matrix as the solid. Curve smoothing is done by a moving average process, which averages the present observation with the one prior to it and the one following to produce a smoothing of the individual observations. The resulting curve is plotted with time as the X axis and frequency of observations as the Y axis (Greenfield, 1973).

Bond and Pruzek (1972) investigated the use of time series analysis to compare attention profiles for significant deviations. The limitations of the conceptual framework of time series analysis and computer programs for time series analysis make this procedure workable only when specific points in a given profile have been specified. This is done by first determining visually the differences in the peaks and troughs of the attention profile prepared in either form. The techniques to compare separate series are under development and may be available in the future. At present, though, the "eyeball" of differences in portions of a profile or of independent profiles will have to suffice.

Figure 2-5: Line Graph of Attention Data

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Chapter III

Investigations Concerning Testing Effects With Educable Mentally Handicapped Children

A major concern guiding the research investigations at the Computer Based Project has been that of testing effects on the population used by the Project. Two aspects of the general question are addressed in this chapter: the effects of pretesting and the effects of response modality.

Effects of Pretesting

The possibility of cuing effects in the use of a pretest in media evaluation procedures has been of concern. The Solomon Four Group design was conceptualized, but modified to conserve effort and subjects by eliminating the pretest-only and posttest-only cells. A simple pretest-posttest design resulted, where the subjects are their own control. In a number of situations, however, administrative activity resulted in data sets that fit into the Solomon Four, and these were used to check pretest effects. The premise that pretests cued the subjects was rejected (Bond, 1970;1971). It was found, rather, that the use of the pretest tended to depress subsequent posttest scores approximately 10%. The results were attributed to the procedural requirement of lengthened attention span and possibly lowered interest level when a pretest was administered before the showing and a posttest after. Thus, posttest scores obtained from the media experience were lower because these items appeared at the end of an experience, and the likelihood of sustained viewer attention was less than if the lengthened experience had not included a pretest.

A second observation was the tendency of subjects not to answer an identical pretest item when it was presented again in the posttest, particularly if the subject thought he had answered correctly in the pretest experience (Bond, 1972 b).

The effects of time spacing for pretests prior to seeing a film were studied during the first year of film data collection. Little difference was found between the pretest or gain scores for tests given one week prior to the viewing of the film when compared with pretests given directly before a viewing. The pretest was administered in one of two situations: (1) after the showing of an unrelated film and its posttest items; or (2) prior to showing an unrelated film. In the first case pretest scores were lower than in the latter case. Most of this difference could be attributed to the attention span of the subjects, as mentioned earlier. Administering the pretest items and ten posttest items after a film showing made a rather long session. There seemed to be a tendency of the children to "hurry through" so that they could get on to the next more desirable exercise or activity. In the second case, this tendency of the subjects to hurry through the unrelated pretest items so that they could get on with the more desirable activity of watching the film seemed to be present; however, the subjects were fresh and were observed to be more willing to "put up with the test" as a prerequisite to being shown a film. No evidence was observed of the remembering of the pretest items from the week before after seeing the film presentation and taking the posttest.

The pretest-posttest design was varied in the third year (1971-1972) of film data collection to allow the use of "pretest-only" groups as film viewing groups. This was done by mixing the sets of items from two films. The "seen" film items were related to a film the group viewed; the "unseen" items were related to a film they did not view. These mixed items were presented as a single test following the film showing, thus eliminating the lengthened presentation caused by a separate pretest administration before the showing. The possibilities of cuing and repetition of the same item were not present in this latter arrangement because the item was seen by a different, independent sample. Following the test, the items were sorted into the two film groups (seen and unseen) prior to analysis. Findings indicated no change in level of pretest (the unseen film) scores as compared with previous separate pretest administrations (Bond, 1972a).

Response Modalities

A second concern has been the mode of collecting student responses. Difficulty had been experienced by special education teachers in getting appropriate, valid responses from EMH children during group administrations of standardized tests, raising the question of whether or not these same children could be expected to give appropriate responses to items asked about films in the evaluation process. It was decided that an automated data collection system would simplify question-answer procedures. The General Electric SRS 1000, an electronic system providing each respondent with five desk-top mounted buttons, interconnecting circuitry, and a computerized

analysis, has the capability of providing either immediate or delayed confirmation of the correctness of a response. Several investigations into these effects are reviewed.

Results of investigations to determine the reliability of SRS obtained responses with paper-pencil responses were contradictory. One study indicated that posttest scores were about 10 percentage points higher when the test was administered on the automated system (SRS) than when done in a paper-pencil mode (Bond, 1970). In another study, however, a number of the SRS stations were inoperable for several data collection sessions. A paper answer strip was given for those students at the non-functioning stations to record their answers. Comparing the paper and pencil scores with the SRS responses showed no significant differences between SRS and answer sheet scores (Bond, 1971). A similar finding resulted when the posttest scores of otherwise similar EMH groups, one using the SRS and one using paper strips, were compared.

Some difficulty was experienced in the data from the primary level students using the SRS system. Preliminary investigations indicated that nearly half of these children could not distinguish the numbers 1 through 5 (Spaid, 1970). Several experiments with pictorial and color-coded response sheets had not significantly improved the correct responses of primary children (Smith, 1970). A training sequence for the SRS was designed to teach these children to match numbers and other answer choices with the appropriate answer button (Morris, 1972) with a resulting increase in discernable results from a given question set in the SRS facility.

Flowers and Bond (1972) studied the effects of having the same response number for all items and revealed that intermediate EMH children began to learn (or catch on to) the appropriate response after six to nine items, when the same number-button was used as the correct response to all items.

A study by Anastasio (1972) revealed that the use of answer confirmation on pretest responses had little training effect on cuing students as to the correct response for that same item, if it appeared on the posttest after viewing the related film. Although the children seemed to be playing a game of "getting the most correct responses", it was done in more of a gambling spirit than one demonstrating prior learning. No differences were observed on posttest scores between confirmed and unconfirmed pretest scores.

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Chapter IV

Investigations Concerning Vocabulary

One variable which may be important for learning by children from sound-narrated or captioned films is the vocabulary used in the narration or captions. Investigations have been conducted by the Project to identify and validate with EMI and SSR children a vocabulary list that could be used to measure the vocabulary level of the captions or narrations on films. To date the investigations have been two-part: validating of applications of an available vocabulary list and the developing of techniques to process the text of the narrations to compare the words with the vocabulary list.

Validation of Vocabulary Lists

To identify a standard from which to measure vocabulary levels of media, a search of the literature on vocabulary was conducted and the compiled list, *A Functional Basic Word List for Special Students*, found. (Tudyman and Groelle, 1953). This list contains 2483 words arranged by grade-level difficulty that are considered by the compilers to be the most appropriate for the day to day needs of the special pupil learning to read. The *Functional Basic Word List* is divided into three levels as follows:

> *Level One* consists of 1,226 words which "reflect the interest and social living experiences and social maturity levels of the child." There are five sub-levels for students with a chronological age (CA) of 8-0 to 12-6, a social age (SA) of 7-0 to 11-6, and a mental age (MA) of 5-7 to 9-3.

1-A.	Pre-primer	(75 words)
1-B.	Primer	(142 words)
1-C.	First Grade	(279 words)
1-D.	Second Grade	(324 words)
1-E.	Third Grade	(406 words)

Level Two consists of 641 words suitable for students with CA 12-7 to 15-6, SA 11-7 to 14-6, and MA 9-0 to 10-3. The 616 words in *Level Three* are suitable for students with CA 15-7 to 18-0, SA 14-7 to 17-0, and MA 10-0 to 12-0.

The list was found to contain most words common to other lists: Gates (1926), Thorndike and Lorge (1944), Russell (1948), Betts (1949), McLatchy (1951), Rinsland (1953), and Dolch (1956). The list was tested with Project populations to verify its classifications and adapted as standard to measure vocabulary levels of media.

Three studies were directly concerned with list validation. Lewis (1972) established that the levels indicated by the list, particularly the subdivisions of *Level One*, were valid for the City School District EMH children.

Basic instruments and procedures for testing vocabulary levels with EMH and SSR (emotionally handicapped) children were developed for both reading (written) and oral (aural) vocabulary to determine if the subjects tested knew the words that Tudyman dnd Groelle suggest they should know. Three procedures were developed based upon the following definitions:

Read: when a student is presented with a word in writing, he will respond by emitting the sounds associated with that word.

Written meaning: when presented with a word in writing, the student will use the word in a sentence.

Oral meaning: when presented with a spoken word, a student will respond by using the word in a sentence.

Criteria: The experimenter determines that the subjects used the word in a (1) grammatically correct manner (i.e. a noun is used as a noun) and (2) a conventional manner (i.e. "I saw the cat", versus "I ate the cat") to demonstrate his capabilities to associate the word with its referent.

The first procedure, a Verbal Recognition Test, measured the subject's ability to read orally a word presented from the printed page. The second procedure, a Written Word Meaning Test, determined whether a subject knew the meaning of a printed word. Subjects were asked to use the word in a sentence. All students sampled were able to give a response to this request in such a way that the experimenter could make a judgment based on the criteria listed above. The third procedure consisted of an Oral Word Meaning Test, in which a word was presented orally by the experimenter in addition to the printed word being shown. Trials on ten EMH children provided satisfactory results for determining subject levels on the list.

Lewis concluded that the students tested could read the words as recommended and were able to give meanings of words at a level higher than expected when the words were presented orally.

To use the *Functional Basic Word List* for analyzing and classifying film captions and audio narration, it was considered necessary that the Project investigate word-level assessment for variant forms of list words:

specifically, regularly formed plurals and past tense verbs. To assess the level of plurals (Wood and Bond, 1972), a review of the list itself was first conducted to determine the treatment of plurals. Four conditions of plural listing were found: (1) plurals without singular form in the list (i.e. *ashes*); (2) plurals lacking a commonly used singular form (i.e. *clothes, dues, politics, slacks, trousers*); (3) irregularly formed plurals for which listing preceded the singular form (i.e. *children, feet, leaves, mice*); (4) irregularly formed plurals that followed the singular form listing at the same or higher level (i.e. *men, women, cookies, matches*). In general, however, plurals formed regularly through addition of *s* or *es* were not included as separate entries.

To determine the level of regularly formed plurals, investigations with EMH children were conducted. Procedures included the Written Word Meaning Test and Oral Word Meaning Test developed by Lewis (1972) to validate list levels with the Project population. Further procedures were developed to determine students' knowledge of the plural, depending on the apparent ease with which subjects constructed the criterion sentences for the singular form. A subject unable to build sentences easily was supplied with frames calling for plurals. An additional procedure to test aural word recognition and discrimination between singular and plural forms was developed for students who appeared to have difficulty with verbal expression. Simple line drawings representing items corresponding to the noun labels were presented, and then a student was presented a singular or plural form of the word orally and asked to

point to the corresponding image. Thus one could test whether or not the child could associate the orally presented noun with its corresponding iconic representation and whether or not he discriminated between lone singular forms and plural grouped figures. A variation of this procedure occurred as several students became enthusiastic and asked permission to make their own drawings. In this case, the examiner presented the singular form of the word orally (*dog, box, face*), asked the student to draw what he thought the word represented, and then asked him to draw the plural forms: *dogs, boxes, faces*. Several of the words selected, especially names for parts of the body, were tested for aural recognition by simple pointing procedures.

The findings from the investigation supported the hypothesis that if a subject knows a singular word, he will recognize the *s* or *es* variant. The investigations examined only base-unit recognition. No attempt was made to determine whether or not the students tested recognized the concept of plurality.

Past Tense Assessment

The question of determining level of word-list variants found by adding past tense morphemes was investigated (Kessler and Bond, 1973). Difficulty was encountered with the sample population when trying to communicate the concept of "past", "past tense", or "it happened yesterday" to the EMH children. Contrary to Lewis's findings, most of the primary EMH subjects were unable to read the stimulus words (verbs) as required for the Verbal Recognition Test and Written Word Meaning Test. The Oral Word Meaning Test was tried. Subjects could repeat the word orally but

had difficulty using the word in a sentence. Their efforts tended to result in a sentence lacking the stipulated word or a meaningless group of contrived words that was uninterpretable. A third technique was developed using suggestions made by Wood. A child was engaged in a more informal activity where he was given paper and crayons and asked to create a picture of himself doing something he liked to do. When finished, the subject was asked to describe some of the things he had done the previous day. The interviewer made mental note of the use of the present and past tense verbs in the description. Following the picture making and narrative interview, the examiner displayed a card bearing the present form of a verb and read the word. The examiner then employed techniques used in the Distar Language Program (Science Research Associates, 1969) where children are supplied with a verbal unit and asked to imitate it as shown below.

Example: The student was asked, "Did you *dance* yesterday?"

S	"Yes." (If a *No* answer is received, another verb is used.)
E	"Say the whole thing."
S	"Yes, I *dance(d)* yesterday."

The examiner noted the word form used in the second response. If the *ed* form was audible, the subject was scored as demonstrating knowledge of the past tense. All the verbs on the list were subsequently substituted for the underlined verb in the example above.

It was observed that in the verbal descriptions of the subjects' activities, the past tense was employed somewhat frequently and arbitrarily. A disregard for conventional past tense forms of words was

especially marked in the descriptions by black children. These same children seemed able to conceptualize the meaning of past tense when describing their activities *yesterday*, although the pronunciation of the *ed* was not always audible to the experimenter.

The conclusion that, for Project purposes of vocabulary level analysis, the past tense form of a verb can be classified at the same level as the present tense was based on data where subjects seemed to be able to use the present and past tense forms of words in level 1-B and 1-C. Some difficulty of using the past tense of verbs in level 1-A was identified; however, all subjects were functioning at a MA of 6.5 and were able to demonstrate that they knew the meaning of list words through level 1-C. The specific verbs in level 1-A may tend to be more useful in their present tense and used less by primary children in the past tense. Investigations with level 1-B and 1-C verbs suggested more equal use of present and past tense. Conclusion was reached that EMH children of primary level seem able to recognize the past tense form of verbs near the level at which they recognize the present.

Techniques to Analyze Narrative Text

Once the *Functional Basic Word List* had been validated as an appropriate standard for the EMH population, developmental efforts were begun to create computer programs to refine the task of analyzing texts. First efforts involved a staff member's transcribing the caption or audio narration, tallying frequencies, and making comparison to the *Functional Basic Word List* to obtain level classification to verify that the word was not in the list. Realizing that all of these tasks were more or

less mechanical in nature and involved making comparisons to determine frequencies, adding to the list, alphabetizing and checking for list inclusion, four computer programs (WRDLST) were written to handle the tasks (Greenfield, 1973).

WRDLST accepts the narration or text in sentence form on cards or paper tapes and produces an output consisting of an alphabetical list of all words used in the narration, the frequency of use, the *Functional Basic Word List* level classification (seven levels) for each word (or an * for those not in the list) and a summary of the frequency and percent of words at each level and those not listed.

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Chapter V

Investigations Concerning Children's Responses

The Project model of media evaluation is learner-based, requiring that students as evaluators indicate by their behavioral responses that the materials being examined have or have not been effective. Such a model necessitates the gathering of information about the Project efforts to measure the cognitive and affective responses of EMH children in concert with, or as a result of, the viewing of instructional films.

A number of observed limitations have been recognized as characteristic in this test population of EMH children, as discussed previously. They are unable to read many commonly used words and limited in verbal descriptive expression. Bond (1972) reported the results of taped personal interviews with EMH children of primary, intermediate, and secondary levels for the purpose of assessing the effects of a specially selected film, "A Very Special Day", and found confirmation of the verbal limitations of these students. Leading questions were asked such as "Who was in the film?" and "What were they doing?" in an effort to get the children to talk about their experiences. An analysis of the transcribed interviews revealed that:

(a) The children gave short one-word responses to the interview questions.

(b) All levels (primary, intermediate and secondary) of EMH children exhibited similar responses.

(c) If a question were stated calling for *yes* or *no* response, a student could identify settings, sequences of events and simple cause-effect relationships. Students did not verbalize these events voluntarily.

(d) Concepts such as father-daughter, boy-girl or peer relationships, were essentially non-existent in student responses.

Anastasio (1973a) observed that children who were being interviewed had difficulty describing their experience after viewing a film and demonstrated that those children with low verbal abilities could indicate a concept learning by using a photo sequencing task. He reported that standardized IQ tests such as Stanford Binet used a sequencing task and that Frostig and Maslow (1968) and Meeker (1969) had identified sequencing as a visual motor skill to be emphasized. Using these concepts as a basis, Anastasio set up a study in which one group of children were asked to sequence 5 photographs portraying a concept that smoking has ill effects on the lungs. Another group of children were shown the film "Be Smart, Don't Start" and, following film presentation, asked to sequence the photos and describe the meaning the sequence communicated. Those who saw the film were also interviewed, using a standard format. Scores were derived for the sequencing activity, the verbal, visual, and auditory parts of the interview, and the judgment of the experimenter on concept definition. Comparing the sequencing scores with observers' judgments of student verbal ability revealed a positive, but not significant, correlation of .40. The sequencing scores were significantly different for those

seeing the film as compared with those who had not, suggesting that the concept of the ill effects on the lungs of smoking can be measured using sequencing techniques and circumventing the verbal handicap of EMH children.

Of considerable importance to CBP procedures was the question of whether or not children's attention to a film influenced cognitive test scores. The use of pretest-posttest questions to determine the instructional effect of a film has been summarized in Chapter I. Generally, the basis of selecting items for criterion instruments has consisted of adults judging the pertinent content from previewing the film and studying prepared outlines, then creating items which reflect mastery of this content. Alternatives have been investigated, however, to determine other possibilities. From the attention profile of a given film the high points and low points were identified with the content concept being presented (Bond and Spaid, 1971) and items written specifically for these highs and lows. After showing the film to other groups, the correct responses to these items were grouped by high point and by low point. No discernible differences were found between the number of correct responses on a subgroup of items written for the low points and those for the high points. The correlation between the attention profile obtained in the latter case and the one used to write the items was .79, indicating that they were not decidedly different. The profile for primary children was similar to the profile for intermediate children.

Observation of student attending behavior during film presentations raised further questions. A search of the literature on measurement of attention was conducted by Lewis (1972a). He found a number of suggestions for technical procedures which eventually led to the construction of a special facility for using conjugate reinforcement techniques: a procedure in which the stimulus is also the reinforcement. Lewis designed and built the facility as a two-room system. Observation is conducted in one room, the student responding in another. The capability of recording profiles of response frequencies, audio responses and visual responses is made possible. The subject views the medium on a rear projection screen, hears the audio through a speaker, and responds by depressing one or more switches mounted in the arms of the chair. Two or more slide projectors provide capabilities for simultaneous projections such as visuals and captions. A 16 mm projector provides movie capability.

Lewis (1973) conducted a study using conjugate reinforcement procedure to measure attention to stimulus color (color or black-and-white) and degree of realism (picture or drawing). In the procedure, the presentation time of the stimulus varies directly and immediately with the subject's rate of response. In this particular study, the screen was lit with a stimulus for one second each time the subject emitted a response. Results indicated that none of the independent variables, (color, black-and-white; picture, drawing) had significant effect on the attention measure. However, a trials by color interaction and a trials by color by sex by realism interaction was observed. In the color by trials interaction, the black-and white group showed higher attention scores

over trials while the color group showed lower scores. Posttest data showed that pictures were significantly preferred to drawings by all groups. Other questions currently being investigated through the facility include the use of captions.

Affective Responses

The Project recognized early that films had more effect upon the viewer than could be measured from a few cognitive items presented after the film showing. Early efforts to collect this information from interviews proved fruitful and relevant to the evaluation efforts. Krathwohl, Bloom and Masia (1964) categorized the affective domain as consisting of a continuum of five major areas: receiving, responding, valuing, organization, and value characterization. The first three are divided into three sub-areas; the last two, into two sub-areas. The attention profile data collected by CBP is obtained by recording sustained eye contact of the viewer with the presented visual: it is categorized as *receiving - selected attention.* The liking response in the interview items is categorized as *valuing.* The relationship of data collected in the evaluation process and the affective domain is rather loosely conceived; however, by identifying efforts with an affective domain categorization, it is hoped that the results indicated by the data can be explained in more generalizable terms.

Smith (1970) noted that secondary children began to read aloud the captions on filmstrips as she presented the visual and read the caption. Interviews with the student revealed he had "discovered he could read."

This excitement resulted in an observed interest to want to participate in future sessions indicated by a request of "When can I do this again?" etc., or a plea to choose him again. Encouragement was given to have the students read the captions with assistance from the observer whenever possible.

Numerous observations and summations by SRS operators suggested that some films seemed to affect strongly the attitude of the viewers. Bond and Rosing (1973) set up a desirable attitudinal model consisting of negative responses to owning a gun, killing animals, and hunting, using statements alluding to these topics and requiring the viewer to indicate his position in a dichotomous or trichotomous scale. Viewers were pretested, shown the film "The Hunter", and posttested. The results defeated adult conceived attitude models. The respondents moved further from the proposed model as a result of having seen the film, rather than toward the model.

Investigating children's judgments as to the age of a film, Anastasio (1973) found that their judgments contradicted fact and teacher recommendations. He showed films which used fashions of 1950 and 1960 to the children and asked them to judge these against the question, "Was this film made long ago or just made?" Teachers were asked to judge the films as being dated and usable or so outdated that they were not suitable for instruction. Teachers rated the films as being outdated and having very limited academic value. The subtle cues of hair, dress, and automobiles were not mentioned and seemed to be overlooked by the children, however. Anastasio concluded that such cues do not necessarily obstruct the content message in its effectiveness with EMH children.

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Chapter VI

Investigations Concerning Teacher Reaction and Opinion

CBP staff recognized early the importance of finding out what the teacher had to say about media and its use. Through workshops designed to provide training and guidance in the use of media for special education teachers, through surveys of teacher attitudes toward the work of the Project, and through participant observation, teacher attitudes were surveyed.

Workshops

Measure of teacher attitudes was first obtained by CBP through a pretest administered during a workshop for media use held for 37 teachers in August 1971. Teachers indicated through their responses that they felt they could plan effective instruction for special education students and that they were generally not bothered by machines or computers. They indicated positive attitude toward films, perceiving special education students as learning control from films. Posttest measurements at the end of the workshop indicated increase in positive attitude toward films. Teachers also reported a strong desire to preview film materials and to use some standardized reporting or rating system consisting of summaries based on actual use of materials. Furthermore, teachers at the workshop indicated strong interest in planning for individualized teaching with special education students.

Efforts to determine more precisely the parameters of individualization were piloted by studying *Structure of the Intellect (SOI)* profiles using individual intelligence test (Btanford-Binet and WISC) items,

according to Meeker classification (1969). Blazey and Mead (1972) reported the findings of trying to prescribe instructional activities based on the SOI profile for a given child. These efforts were positive and provided information for additional training for teachers in using the SOI profile to organize EMH instruction. A unit consisting of six hours of instruction for teachers was included for the 8 workshop participants in August 1972, (CBP, 1972). These teachers responded by requesting computerized SOI profiles (Greenfield, 1972) for children in their classroom.

Attitude Surveys

To those teachers cooperating with CBP evaluation procedures, Project staff provided advice and materials for enriching the instruction of EMH children. The form and degree of assistance varied from casual interaction and resource service to direct assistance within the classroom over a prolonged period of time. Observations of the effects of this personal service were recorded in both formal and informal ways. One could report to a staff member or in general meeting the results of a particular interaction request, service, or perception. Formal observation techniques consisted of surveys and participant observation.

Johnson (1971) surveyed teacher opinion concerning Project services. Twenty Thurstone-type items were used to survey four areas: questioning and technique, films, staff personnel, and general feelings. Johnson found rather neutral to negative response on most items: that the films

"though sometimes useful," did not fit into any current lesson plan; that weekly visits were disruptive of the class routine; and that teachers were generally not kept informed concerning student progress or response. Teachers reported, however, that the children seemed to look forward to the weekly visits, that they related well to the staff members, and that they desired to participate the following year.

Lewis (1972) followed about six months later with an interview survey of 25 of the 28 teachers participating in the Project evaluation efforts. The survey investigated teacher attitude, teacher remarks that may affect student performance, and knowledge of Project operations. During the interview the teacher was rated as being positive, neutral, or negative on each of 30 items in three classifications of students, teacher, and Project. Sixteen specific findings were listed and generalized into three general statements:

1. Teachers desire to be informed of Project activity.
2. Films and criterion items should be chosen carefully for level and class.
3. Teacher opinion should be sought by Project personnel.

Participant Observation

During the fourth year of CBP operations, a research team was organized to make extensive observations of 8 designated classrooms using participant observation (PO) to answer questions concerned with the use of media in the classroom and teachers' use of CBP services. The technique has been described by Bogdan (1972).

A report summarizing the activities of the first two months (Bogdan, Brogden, Dodge and Lewis, 1972) had the following generalizations:

1. The instructional value of a medium does not necessarily lie in the medium but in how it is perceived and acted upon by those who might use it and those who are objects of its use.
2. Improved teacher effectiveness of media involves getting teachers to use new insights into objects around them rather than providing more objects.
3. How media is defined by those in a classroom setting is more important than the nature of the media.

Two reports (Bogdan, et al, 1973 a,b) analyzed the over 600 pages of observer notes concerning the use of media in the classroom. Two categorizations were made in the first paper for media use - group use and individual use. Media was chosen for group if it was thought to aid learning related to reading, writing, and arithmetic, if procedures for its use were made specific, and if it could aid the teacher in structuring the school day. An additional criterion was whether or not a given material had been demonstrated as workable by other teachers. Media tended not to be integrated into the curriculum but used, rather, to fill gaps and to entertain. Films, particularly, provide a breadth, a common experience, and brighten the classroom atmosphere. Teachers tended not to see the film in terms of its capacity to teach cognitively and did not select them for this purpose. This finding seemed to be a variance with the generalization above if one conceives of the three R's as involving a great deal of cognition. On the other hand, the study found teachers not taking advantage of the affective potential of film. These findings seemed to reflect a belief among teachers who view mass produced media as not tailored to their needs or to student needs.

Under the individual uses of media, some rather startling observations were recorded. Teachers might actually refuse to relinquish control of the equipment or media to a child. They saw most devices and materials as being useful for only one or two children; however, they were quick to point out that designers need to have definite ideas of the type of student the materials are prepared for. Teachers appeared to see these materials as adjuncts to their primary resources, as enrichment to be used in free time periods, or as rewards for good behavior. The limiting conditions of a typical classroom make student use of individual devices and materials difficult because of the "gerried-up" facility to provide for it. There was some evidence that individual devices and materials tended to limit socializing and break up teacher control techniques.

In the second media-use report, the authors summarized some general trends in terms of *innovation-drop-off effects, novelty effects, squirrel effects,* and *hangups and hazards of media use.* Of importance in the document is a theme suggesting that in special education classrooms in the city schools the written word is all important and the triangle of teacher-written word-student is the domain where academic learning takes place.

The *innovation-drop-off effect* was simply a decrease in use over time. Teachers explained these effects in terms of a material's being perceived as inappropriate to the needs of the teacher and the needs of the student. Media *novelty* has potential affective educational value by arousing interest, providing enjoyment, and breaking up the routine.

Teachers seemed to actively exploit the novelty effects of media, many times by default rather than planning. The *squirrel effect* was defined as the situation where a teacher checks out equipment and materials and hides them in the room so that no one else has access to them. The *hangups and hazards of media use* summarized observations that the low use rate of media, other than books, chalkboards and teachers, is due to the inconvenience associated with the media, related equipment, environment, control and electrical support. The common fear of shock associated with electrical appliances carries over directly to any devices that use standard electrical outlets. Many classrooms were found to be inadequately wired for the demand a class using individual devices may make on the system. The delays and incompetencies experienced in the repair of broken equipment was the most common inconvenience. All teachers were found lacking training in alleviating simple problems such as a burned out bulb or a jammed filmstrip.

The participant observation studies refuted several findings reported from the teacher interviews and surveys. In the surveys teachers indicated a willingness to participate in Project activities, yet PO reports confirmed that media were not worked into curriculum and teachers did not use CBP personnel. Teachers indicated a need for materials in cognitive areas. yet PO findings indicated that materials were not used to develop cognitive skills. During the workshops, teachers were found to be oriented toward individual instruction yet PO revealed the classroom as group oriented and media considered as a group activity.

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